



## RESEARCH ARTICLE

# IMPACT OF TEACHER EDUCATION TRAINING ON THE INTELLIGENCE OF PRE-SERVICE TEACHERS

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### ABSTRACT

This study primarily aims to explore the impact of teacher education training on the intelligence of selected pre-service teachers enrolled in the University of Cebu Lapu-Lapu Mandaue. A descriptive and comparative design was utilized to collect and analyze data from a purposive sample of 56 pre-service teachers. A battery of psychometric exams that include the Otis-Lennon Test of Mental Ability, the measure for intelligence, was administered to the representative upon the admission of the pre-service teachers into the program and upon their completion of the program's course requirements. Descriptive statistics were used to describe the IQ of pre-service teachers, the Shapiro-Wilk was used to test the normality of the data, the paired sample t-test was conducted to see the significant change in their IQ, and One-Way ANOVA was used to determine the significant differences of the IQ per field of specialization of the BSED program. The results showed a slight increase in the IQ level of pre-service teachers across all majors. Furthermore, the p-value ( $p < .05$ ) for the overall IQ level, indicating a significant change in the intelligence quotient (IQ) of pre-service teachers during their teacher education training, as measured by the Otis-Lennon Test of Mental Ability.

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## INTRODUCTION

In one sense, "human intelligence" is something all humans share in common: it is what traditionally makes us out from other animals and has made *Homo sapiens* one of the more successful species on the planet. It involves language and the capacity to develop and transmit culture, think, reason, test hypotheses, understand rules, etc. Being intelligent matters; it makes a big difference to human lives. Sharp men and women thrive. Astute thinkers solve problems. Questions get answered by those who are clever. Smart people succeed at challenges at which duller individuals fail. Competent planners move ahead. Therefore, it is essential to understand how environmental factors like education influence intelligence. The growth of psychological testing has contributed to a state of affairs in which people share a widely accepted viewpoint concerning the place of intelligence in our mental lives. According to that view, human intelligence is a measurable quality possessed by different people and constrains each individual's mental capabilities; it is seen as an inherent capacity determining a person's potential to succeed at those tasks and problems that call upon cognitive powers.

Therefore, psychologists have looked for ways to assess the degree of intelligence different people possess. Immense energies have developed and applied intelligence tests in the past hundred years. Hence, a lot of research has been done to understand intelligence. There is broad agreement among scholars that intelligence and education are heavily interlinked. For example, in an early study by Jencks *et al.* (1979, p. 102), there is a detailed account of the significant correlation between cognitive test scores and the amount of education obtained. In their study, it was found that correlations range from 0.40 to 0.63. Recent studies reached the same conclusion (Deary & Johnson, 2010; Strenze, 2007). For example, in a recent meta-analysis study by Ritchie and Tucker-Drob (2018), they found out that there is an average increase in intelligence test scores of 3.4 intelligence quotient (IQ) points per year of education. While many studies have explored the relationships between IQ and education in general, little is known about its nuances on pre-service teachers. Additionally, there is very little literature that understands the relationship between intelligence and education in the context of Filipinos and the Philippines. Hence, in this study, the overall aim is to come one step closer to understanding the impact of education on intelligence in the context of Filipino pre-service teachers.

**Objectives:** This study aims to understand the impact of teacher education training on the IQ of pre-service teachers. Specifically, this aims to:

- Describe the IQ of pre-service teachers upon admission and completion of the teacher education training.
- In addition, determine the significant change in IQ scores of pre-service teachers upon entry and completion of the teacher education training.
- Determine the significant change in IQ scores of Pre-service teachers per field of specialization.

## METHODOLOGY

**Participants:** The purposive technique was used to obtain a sample of forty-nine (49) pre-service teachers currently enrolled in the Bachelor of Science in Secondary Education program of the University of Cebu Lapu-Lapu and Mandaue. 72.0% of the sample are English majors, 12.0% are Filipino majors, and 16.0% are Math majors.

**Instruments:** The Otis-Lennon Test of Mental Ability served as a measure of intelligence in this study. It is an 80-item group-administered test of general intelligence that has been extensively normed and researched (Anastasi & Urbina, 1997; Otis & Lennon, 1969). This test has a mean of 100 and a standard deviation of 16. In addition, Otis and Lennon (1977) reported test-retest reliability coefficients between .84 and .92, suggesting this instrument is stable over time.

**Procedure:** Psychometric data of the pre-service teachers was obtained from the University's Guidance Office. As part of the University's admission and exit process, psychometric data, including the intelligence of pre-service teachers, are assessed by the University's Guidance office. The first assessment of intelligence was done upon the admission of the students into the program, and the second assessment was done after completing the program's course requirements.

**Statistical Analysis:** Upon completion of data, it was subjected to statistical analysis. The statistical analysis was done using Jamovi version 2.4.11. Descriptive statistics was used to describe the IQ of pre-service teachers. Shapiro-Wilk was used to test for the normality of the data. Paired sample t-test was then conducted to see the significant change in their IQ. One-way ANOVA was used to determine whether IQ varies by field of specialization. Alpha levels were set at 0.05.

## RESULTS AND DISCUSSION

**Table 1. Normality test using Shapiro-Wilk**

Variable	W	P
Psychometric Test	.980	.556

The table 1 shows the normality testing of the data using the Shapiro-Wilk test. The Shapiro-Wilk test with ( $p > .05$ ) indicated that the data did not violate the assumption of normality (Mishra *et al.*, 2019). This implies that the parametric statistical scale was appropriately used in the study. The paired sample t-test and One-way ANOVA were recommended to determine the significant change in the IQ level of the preservice teachers, given that the data met the

assumption of normality. The Shapiro-Wilk test is a widely recommended method for testing normality, especially for small sample sizes, and its results are often used to make decisions about the application of parametric statistical methods (Ghasemi&Zahediasl, 2012).

**Table 2. IQ of pre-service teachers upon admission of the teacher education training**

Classification	Frequency	Percentage
Above Average (AA)	3	6.0%
Average (A)	31	63.0%
Below Average (BA)	15	31.0%
Overall	49	100.0%

The table 2 presents the IQ scores of pre-service teachers upon admission to teacher education training. The data indicated that 63.0% of the pre-service teachers obtained an average IQ score, with only 6.0% scoring above average. This suggested that the IQ scores of the pre-service teachers upon admission were largely clustered around the average range, with a small percentage scoring above average. The implication of this was that the majority of the pre-service teachers had similar IQ levels upon admission, which could be a relevant factor to consider in the context of teacher education and training. In addition, the alterations observed in the educational systems throughout history can have an effect on cognitive skills and performance in examinations (Must *et al.*, 2008).

**Table 3. IQ of pre-service teachers upon completion of the teacher education training**

Classification	Frequency	Percentage
Above Average (AA)	6	12.0%
Average (A)	38	78.0%
Below Average (BA)	5	10.0%
Overall	49	100.0%

Table 3 displays the IQ scores of pre-service teachers upon completing their teacher education training. The data indicated that 78.0% of the pre-service teachers achieved an average IQ score, with only 10% scoring in the below average IQ range. The data also revealed a 6.0% increase in the number of students scoring in the above-average IQ range, along with a 15.0% increase in average IQ scores and a 21.0% decrease in below-average IQ scores. These findings suggested that, upon completion of their teacher education training, there was a slight overall increase in the number of students with above-average IQ scores, while the majority of students still fell within the average IQ range. This implies that the teacher education training may have had a modest influence on the distribution of IQ scores among the pre-service teachers. Measurement invariance implies that gains over the years can be attributed to increases in the latent variables that the tests purport to measure (Wicherts *et al.*, 2004). It means that any improvements observed over time can be attributed to actual increases in the underlying variables that the tests are designed to measure. In addition, Ritchie and Tucker-Drob (2018) found out that there is an average increase in intelligence test scores of 3.4 intelligence quotient (IQ) points per year of education. The table 4 shows the IQ scores of pre-service teachers upon entry and completion of the teacher education training. The statistical analysis revealed that there was a significant change in the overall IQ scores ( $p < .05$ ) as pre-service teachers progress from the initial admission into the program to the completion of their teacher training in the

BSED program. The lack of significant change in the field of Filipino and Mathematics majors implies that the cognitive abilities, as measured by IQ scores, remain relatively consistent throughout the teacher education journey.

**Table 4. The change in IQ scores of pre-service teachers upon entry and completion of the teacher education training**

Variable	Statistic	df	p	Interpretation
Change in IQ scores upon admission and completion of English major students	-2.455	34.0	.019	Significant
Change in IQ scores upon admission and completion of Filipino major students	-1.256	5.0	.264	Not significant
Change in IQ scores upon admission and completion of Mathematics major students	-0.328	7.0	.753	Not significant
Overall (English, Filipino, and Mathematics)	-2.72	48.0	.009	Significant

The observation of a slight increase in IQ scores upon completion of the training program is noteworthy, but the statistical significance for English majors and the overall performance suggested that this gain hold significant implications for the overall performance assessment of pre-service teachers.

In essence, while there was a subtle shift in IQ scores considering all the majors in the BSED program, these changes were generally statistically meaningful in the broader context of evaluating the impact of teacher education training on cognitive abilities. The findings supported the previous literature that there was a detailed account of the significant correlation between cognitive test scores and the amount of education obtained (Deary & Johnson, 2010; Strenze, 2007).

**Table 5. The change in IQ scores of pre-service teachers per field of specialization**

Variable	F	df <sub>1</sub>	df <sub>2</sub>	P	Interpretation
Change in IQ scores upon admission per major	1.85	2	46	.168	Not significant
Change in IQ scores upon completion per major	.874	2	46	.424	Not significant

The table 5 shows the IQ scores of pre-service teachers per field of specialization. The data indicated that there was no significant difference in IQ scores among the three majors in the BSED program upon admission and completion of the teacher training program ( $p > .05$ ) for both. This implied that the training for each major in the department was comparable in terms of the initial and final distribution of IQ scores. The findings from Table 5 suggested that the BSED program maintained the consistency in the IQ levels of pre-service teachers across different majors throughout the training. This could have had implications for the program's admission criteria and the effectiveness of the training in terms of not favoring a particular major over others in terms of the IQ levels of the pre-service teachers.

This was in connection to Ritchie and Tucker-Drob (2018), there was an average increase of intelligence quotient, thus all majors have gained a slight increase in their IQ over time. It also indicated that the program may have been successful in ensuring a relatively equitable distribution of IQ scores across different specializations, which could have been a positive aspect in terms of promoting diversity and inclusivity within the teaching profession.

## CONCLUSION

Upon careful assessment of the findings of the study, it can be concluded that the initial IQ levels of pre-service teachers admitted to the teacher education program were clustered around the average range, indicating a degree of homogeneity among the cohort. While there was a slight increase in the number of pre-service teachers with above-average IQ scores after completing the training program, the total effect on cognitive ability, as evaluated by IQ scores, was statistically significant. This suggests that, while slight change may occur, teacher education training's overall impact on cognitive capacities was evidently increased. Furthermore, the constancy of IQ scores across majors within the program shows that training is distributed fairly and effectively among specializations, encouraging diversity and inclusivity in the teaching profession.

## RECOMMENDATION

**Based on the findings and conclusion of the study, the following recommendations are proposed:**

- Continuous monitoring and evaluation of pre-service teachers' cognitive capacities.
- Diversifying teaching methodologies to accommodate varied learning styles.
- Further research on aspects beyond IQ that contribute to the pre-service teacher effectiveness.

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